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ABSTRACT

Use of complementarity as a deliberate and necessary program evaluation strategy is discussed. Quantitative and qualitative approaches are viewed as complementary and can be integrated into a single study. The synergy that results from using complementary methods in a single study seems to enhance understanding and interpretation. A review of the literature on mixed method designs reveals that many researchers recognize the value of complementary approaches. Complementarity in program evaluation ensures that outside perspectives, such as skill acquisition and achievement of cognitive objectives, are connected with inside perspectives, such as the meaning that actors assign to different situations. When used as a deliberate program evaluation strategy, complementarity capitalizes on the strengths of quantitative and qualitative research methods to provide enriching explanatory and interpretive meaning to the findings. There is a 17-item list of references. (SLD)

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COMPLEMENTARITY AS A PROGRAM EVALUATION STRATEGY: A FOCUS ON QUALITATIVE AND QUANTITATIVE METHODS

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COMPLEMENTARITY AS A PROGRAM EVALUATION STRATEGY

During the mid 1970s I conducted a large research study on the relationship between the classroom learning environment and the interpersonal competence of young adolescents. The study can best be described as a "layered" research study. At one level I designed and analyzed the results of a city-wide survey. These data were subjected to multiple regression analyses and were graphically portrayed in a series of three dimensional regression surfaces. At another level I was a participant observer in one particular classroom at one particular school. The intent of this situational study was to describe the daily experiences and accounts of the actors in the situation. And, at another level I focused on two selected students - one identified as being extremely competent interpersonally and another deemed to have a very low level of interpersonal competence. In each case I shadowed the students over several school days, talked with them - formally and informally, and interviewed their teachers and parents. In addition to these three approaches I undertook an in-depth review of the literature on learning environments, interpersonal competence and, noteworthy at the time, research methodology.

At the time I was concerned with what Znaniecki (1969) called the "human coefficient". I desperately wanted to get close to the phenomena I was studying. But, I was trapped. The logical-empirical view was the reigning paradigm - and the contributions of researchers are often judged according to insights provided by this paradigm (Smolicz, 1970). On the other hand, indications of a paradigm shift (Kuhn, 1970) had been well documented and the literature was increasingly reflecting social science perspectives opposed to the positivist-empirical view. These so-called "qualitative" approaches included the phenomenological, historical, constructivist and interpretative views of scientific explanation. Key tenets of these social science traditions include: (1) the relativist view that all meaning is socially constructed and

context-bound, (2) the value-ladenness of inquiry processes and results, and (3) the inescapable presence of the inquirer in the inquiry (Greene, 1990).

There was little question that I had used multiple methods in my study. Side-stepping the level of expertise and the quality of the enterprise, I had also employed a mixed-method design. In other words, I had used methods that roughly fit into the quantitative arena and other methods that came under the rubric of qualitative methodology. In Tyack's (1988) words I had attempted to use "different lenses to view the same phenomenon" (p. 25). Lee Shulman (1988) commenting on a study completed by Tyack summarized the learning that I've come to cherish as a result of being involved in this study:

> "Research in education requires judgement and selectivity grounded in broad understanding, certainly broader than can be provided by any single explanatory perspective. Ways of seeing are ways of knowing in more than a single way." (p. 23)

Although I had been tacitly exposed to the concept of complementarity, it wasn't until the early 1980s that I was introduced to the concept more formally. A research colleague had just completed his doctoral dissertation on existential phenomenology as an approach to curriculum evaluation (Rothe, 1979). In this thesis and in subsequent papers (Rothe, 1980, 1981) he explored the concept of complementarity.

Essentially Rothe defined complementarity as a concept which allows for the theoretical linkage of the quantitative (explanatory) and qualitative (interpretative) methods of program evaluation.

> "The two approaches, although different in purpose and world view, interrelate at strategic junctures."
> (p. 5)

The use of a mixed-method design that includes at least one quantitative method and one qualitative method inherently sets the stage for complementarity to occur.

Recent discussions with a psychologist in my own Board of Education made me pause and reflect about the actual uniqueness of this concept. As I was talking, I got the distinct impression that he knew exactly what I was talking about. A rare event indeed.

In fact he was remembering previous academic and clinical assessment experience. The notion of complementarity was very similar to his understanding of convergent and discriminant validity and work he had done with multitrait-multimethod matrices. He quickly provided me with a text by Megargee (1966) which contained an article by Campbell and Fiske on convergent and discriminant validation. In their article Campbell and Fiske wrote the following passage:

> "In contrast with 'single operationalism' now dominant in psychology, we are advocating a 'multiple operationalism'; a convergent 'operationalism', a methodological 'triangulation'; an 'operational delineation', a 'convergent validation'."
> (p. 108)

The major difference from Rothe's notion of complementarity was the "theoretical linkage" across "different paradigms". The idea of using independent measures, albeit within the same paradigm, as confirmation made the notion of convergent validity appear similar to complementarity.

The use of multiple and independent methods is not a new idea. Campbell and Fiske (1966) quote a historian's belief about past events:

> "...if (the) sources are numerous and independent and if they agree with one another (then the historian) will be reasonably confident that their account of the matter is correct."
> (p. 91)

Rothe (1981) uses several examples from physics, philosophy and the social sciences to illustrate the genesis for his concept of complementarity. For example, referring to the writing of the Danish physicist, Bohr, Rothe concludes:

> "...although physics is generally regarded as an objective science, it has a human referent which substantiates a peculiarly cognate relationship between scientific methodology and human interpretation."
> (p. 3)

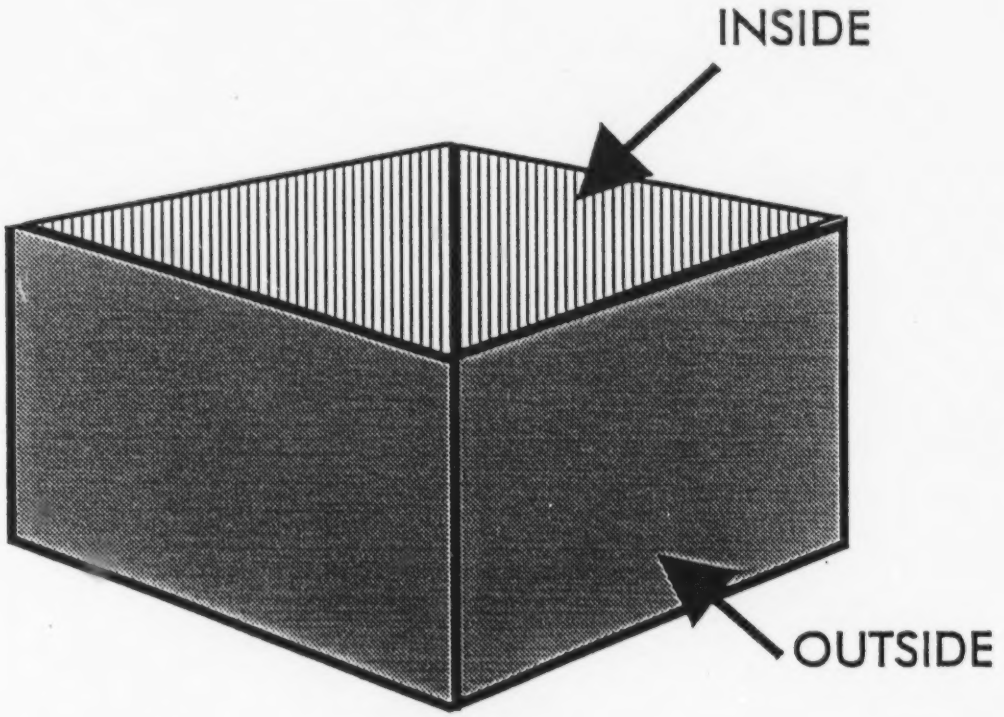
He suggests that Polyani helped root the concept of complementarity in the social sciences by suggesting that:

> "The most important pair of mutually exclusive approaches to the same situation is formed by the alternative interpretations of human affairs in terms of human actions completely in terms of their natural causes....You can interpret, for example, in terms of the causes which have determined my actions of writing, or you may ask for my reasons for saying what I say."
> (p. 3)

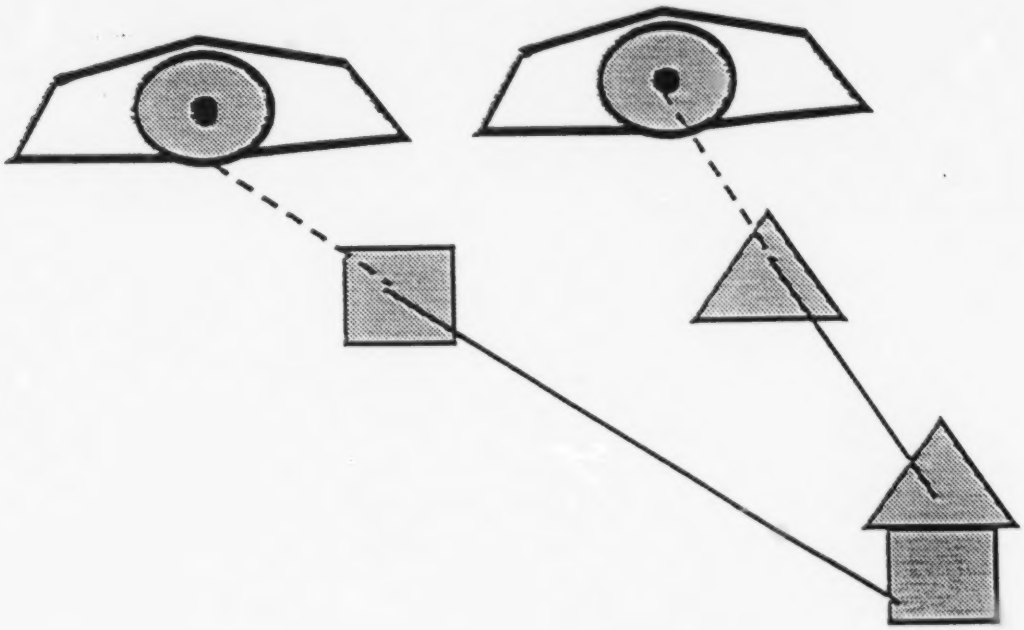
This is not the occasion for exploring in detail the conceptual basis of complementarity. There are, however, two very helpful images of complementarity that Rothe presents - one is the picture

of the inside and outside of a box, the other is the use of stereoscopic photographs:

> "As with a box where the inside pre-supposes an outside, so it is with social phenomena. Built upon knowledge of the everyday worlds (inside) is a more abstracted form of knowledge (outside) which addresses the generalizable features of human actions. Educational researchers have traditionally taken outside views of human actions by systematically observing patterns in social data which lead to regularities that are translatable into quantitative terms and classifiable into parsimonious predefined categories. From our point of view, the categories or outside view of human features should not be separated from inner reality, since human beings cannot be split into fine separate parts. Man is whole. Both outside and inside views of man interrelate to form a complete system. To account for outside generalities we require unities and connections with the inner everyday world..."
> (p. 7)



"Let us think of the inner and outer perspectives of social life as a pair of stereoscopic photographs viewed in the proper way, one eye looking at one picture, the other eye looking at the other. We do not see these two pictures in themselves. In a way, we look through them or beyond them, at their joint image. Thanks to their complementary interaction, the inner and outer pictures provide a spacially deepened image with joint meaning."
(p. 7)



Similarly in medicine, we can attain a fuller meaning of, for example, cancer by considering the "connections" between the outside view concerning biological causes and treatment and the inside view concerning social meaning and perception. Sontag's book Illness As Metaphor (1978), for example, is a helpful complement to a general understanding of illness - be it tuberculosis or cancer.

I have been involved in program evaluations projects for more than a decade now. The general definition of program evaluation that I use is the following:

> "Program evaluation is a process that involves the systematic marshalling of information so that interested individuals are better able to critically debate a specific program and ultimately make more informed decisions about that program." (1990)

Although I have often attempted to use multiple methods and include complementarity, as I understood it, in my general design, I have only recently reconsidered the possibility of including and refining complementarity as a deliberate and necessary program evaluation strategy. Much of this renewed interest has been motivated by the recent writings of key individuals such as Rossman and Wilson (1985), Greene et al. (1985, 1989, 1990) and Mark and Shotland (1987).

Rossman and Wilson (1985) have identified three distinctive perspectives when it comes to combining methods - the purist, the situationalist and the pragmatist. Purists usually focus at the paradigm level and support one of the two dichotomous traditions only. While my personal beliefs and occasional pseudo academic role do tend to favour the qualitative tradition, my present job is too embedded in the practical realities of an educational system to allow me the luxury of the purist perspective. Situationalists focus on method and use both approaches, although certain methods are viewed as being more appropriate in specific situations. Although the two approaches are viewed as "complementary" they are still treated as distinct traditions and one method is generally chosen over another, depending on the study. My personal preference is to integrate the two approaches in one single study. This more pragmatic position also accepts the complementary nature of the two approaches, but attempts to tap the relative strengths of the

different methods so as to better understand the phenomena being investigated. Furthermore, the "synergy" that results from using complementary methods in a single study seems to enhance understanding and interpretation.

Rossman and Wilson (1985) also identify three main functions of mixed methodology - corroboration, elaboration and initiation. Their intent is to demonstrate that qualitative and quantitative methods can be used in a complementary manner to enhance the understanding of complex social phenomena. They present the three functions of mixed methodology as a way of rising above the mere combining of methods.

Corroboration seeks convergence in findings - much like convergent validity. "Its purpose is to confirm or disconfirm established results." (p. 634) Elaboration "provides richness and detail." "It expands understanding of the phenomenon studied through refinement and development." (p. 631) "Initiation is the analytic function that turns ideas around. It initiates new interpretations, suggests areas for further exploration, or recasts the entire research question. Initiation brings with it fresh insight and a feeling of the creative leap." (p. 637)

Mark and Shotland (1985) examine alternative models for the use of multiple methods. They discuss three particular models - triangulation, bracketing and "complementary purposes". The triangulation model presumes that the multiple methods are independent and that the different methods converge on "the" answer. The bracketing model is similar to triangulation with the notable difference that a "range" of estimates is used to report conclusions. "Both triangulation and bracketing models concern the use of multiple methods to address a particular, single research question." (p.98)

Their explanation of the "complementary purposes" model is similar to the concept of "complementarity" used by Rothe (1979, 1980, 1981). They suggest that this particular model includes a number of conceptually overlapping variations: the use of different methods for "alternative tasks"; the use of mixed-methods to "enhance interpretability"; the use of a second method to "assess the plausibility of threats" to the primary method; and the use of multiple methods to investigate alternate "levels of analysis". This latter assessment of different levels of a phenomenon is analogous to peeling the layers of an onion.

Based on an extensive review of the literature and an analysis of 57 empirical mixed-method evaluations, Greene et al. (1989) identified five purposes for mixed-method evaluations and then proceeded to recommend a design based on seven relevant design characteristics. The five purposes for mixed-method evaluations are: triangulation, complementarity, development, initiation and expansion. Each purpose and its corresponding rationale are clarified by Greene et al. in Table 1.

The long-range goal of Greene et al.'s study was to develop a conceptual framework that could inform and guide the practice of mixed-method inquiry. To this end the authors identified seven characteristics of mixed-method designs and then proceeded to present a recommended design for each mixed-method purpose.

The seven characteristics of mixed-method designs that they considered were: Methods, Phenomena, Paradigms, Status, Implementation (Independence), Implementation (Timing) and Study. Using these characteristics they proposed the following recommended design for complementarity:

Table 1: Purposes for Mixed-Method Evaluations (Greene et al.)

PURPOSE	RATIONALE
TRIANGULATION seeks convergence, corroboration, correspondence of results from the different methods.	To increase the validity of constructs and inquiry results by counteracting or maximizing the heterogeneity of irrelevant sources of variance attributable especially to inherent method bias but also to inquirer bias, bias of substantive theory, biases of inquiry context.
COMPLEMENTARITY seeks elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method.	To increase the interpretability, meaningfulness, and validity of constructs and inquiry results by both capitalizing on inherent method strengths and counteracting inherent biases in methods and other sources.
DEVELOPMENT seeks to use the results from one method to help develop or inform the other method, where development is broadly construed to include sampling and implementation, as well as measurement decisions.	To increase the validity of constructs and inquiry results by capitalizing on inherent method strengths.
INITIATION seeks the discovery of paradox and contradiction, new perspectives of frameworks, the recasting of questions or results from one method with questions or results from the other method.	To increase the breadth and depth of inquiry results and interpretations by analyzing them from the different perspectives of different methods and paradigms.
EXPANSION seeks to extend the breadth and range of inquiry by using different methods for different inquiry components.	To increase the scope of inquiry by selecting the methods most appropriate for multiple inquiry components.

(p. 259)

> "complementarity is similar to the triangulation design, with the exception of the phenomenon and implementation - independence characteristics. The phenomenon characteristics has a slight range, indicating that the quantitative methods should be used to examine overlapping phenomena or different facets of a single phenomenon. In complementarity designs, the paradigmatic framework for both types of methods should also be similar, and interpretability is best enhanced when the methods are implemented simultaneously and interactively within a single study."
> (pp. 266, 267)

I do not agree with Greene et al.'s recommendation that complementarity designs should have similar paradigmatic frameworks for both types of methods. Although this is a much debated area, I believe that their suggestion, that is, mixing paradigms is problematic for designs with complementary purposes, restricts their stated rationale of complementarity, namely, "to increase the interpretability, meaningfulness and validity of...inquiry results...."

Perhaps Rothe's (1981) quotation of a passage by Eisner best describes the need for different paradigmatic frameworks:

> "...a behavioral description of an eyelid closing on the left eye at the rate of two closures per second could be described in just that way. But, a thick description of such behaviours within the context of a cultural sub-system could be described as a wink. The meaning of a wink, especially if the person at the other end is someone of the opposite sex is entirely different from a description of eyelid closure at the rate of two closures per second."
> (p. 35)

Although I have a fundamental disagreement with Greene et al.'s recommended design options for complementarity, I do believe that their work provides a helpful framework for clarifying the design options for mixed-method purposes. They have definitely begun to chart the territory of mixed-method evaluation in a truly meaningful and practical way.

Complementarity in program evaluation ensures that outside perspectives, e.g., skill acquisition and achievement of cognitive objectives, are "connected" with inside perspectives, e.g., the meaning that actors assign to different situations. When used as a deliberate program evaluation strategy, complementarity capitalizes on the strengths of quantitative and qualitative research methods to provide enriching explanatory and interpretative meaning to the findings.

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